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<p>One Hundred and fourteen scientist attended the 1989 Gordon Conference on Chronobiology. The program brought together people working at all levels of organization from molecular biology to ecological significance of temporal organization. Two general themes emerged. The first concerned the importance of feedback from circadian rhythm effectors onto the timing system. The second dealt with the significance of the fact that the phase response curves to a variety of phase shifting stimuli appear to fall into only two classes. (K-) --</p>				
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## 1989 GORDON RESEARCH CONFERENCE ON CHRONOBIOLOGY

### Final Progress Report

Air Force Office of Scientific Research Grant #89 0321

The Gordon Research Conference on Chronobiology was held from June 26 to June 30, 1989 at Plymouth State College in Plymouth, New Hampshire. The conference had 114 participants; twenty-three were from foreign countries with representatives from Japan, India, Eastern and Western Europe, and Canada. The participants included graduate students, postdoctoral students, young scientists, and established investigators.

The program brought together individuals that are working at several levels of organization from studies of the molecular biology of circadian pacemaking systems to explorations of the ecological significance of temporal organization. The program included 24 speakers and nine discussion leaders. The speakers were consistently excellent in their presentations, and the participants provided active discussion after every lecture. More time was allowed for discussion than in previous conferences, a strategy that was well-received by the conferees and contributed to the overall success of the conference.

New results from a variety of areas were presented and thoroughly discussed in the spoken presentations. In addition, there was a highly successful poster session that included 41 contributions from the conferees. While a wide range of interesting new data was presented, two new general themes emerged from the talks and discussions that appeared to capture the imagination of the conference. The first of these concerned the importance of feedback from circadian rhythm effectors onto the timing system (e.g., motor output involvement in the regulation of circadian phase). The second dealt with the significance of the fact the phase response curves measured to a variety of phase shifting stimuli appear to fall into only two classes.

Overall, comments made to the Chairman of the conference indicated that this was one of the more productive conferences on chronobiology, and that the quality of the presentations and subsequent discussion was uniformly high. It appeared to be a consensus opinion that the conference was highly successful.

GORDON RESEARCH CONFERENCE ON CHRONOBIOLOGY 1989  
Plymouth State College, Plymouth, New Hampshire  
June 26, 1989 - June 30, 1989

Terry L. Page, Chairman  
Department of Biology  
Vanderbilt University

Woody Hastings, Vice-Chairman  
Biological Laboratories  
Harvard University

MONDAY, June 26

MORNING SESSION 9:00 - 12:30 Molecular/Cell Biology I

Discussion Leader: **Woody Hastings**, Department of Biology, Harvard University

**David Morse**, Department of Biology, Harvard University  
"A Translational Clock in Gonyaulax"

**Steven Kay**, Laboratory of Plant and Molecular Biology, Rockefeller University  
"A Circadian Clock and Phytochrome Regulate Transcription of Higher Plant Cab Genes"

**Akira Mitsui**, Division of Biology and Living Resources, University of Miami  
"Cell Cycle and Circadian Rhythms in Unicellular Nitrogen Fixing Bacteria"

EVENING SESSION 19:30 - 22:00 Molecular/Cell Biology II

Discussion Leader: **Jerry Feldman**, Thimann Laboratories, University of California

**Jay Dunlap**, Department of Biochemistry, Dartmouth Medical School  
"Genetic and Molecular Dissection of the Neurospora Circadian System"

**F. Rob Jackson**, Worcester Foundation for Experimental Biology  
"Genetic and molecular studies of the Drosophila andante gene."

**David Saunders**, Department of Zoology, University of Edinburg  
"Photoperiodic regulation of ovarian diapause in Drosophila melanogaster: The impact of the per gene on time measurement."



Availability Codes	
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TUESDAY, June 27

MORNING SESSION 9:00 - 12:30 Molecular/Cell Biology III

Discussion Leader: Arnold Eskin, Department of Biology, University of Houston

Carl Johnson, Department of Biology, Vanderbilt University  
"Light-induced phase-shifting and  $\tau$ -aftereffects in Chlamydomonas."

Till Roenneberg, Institut fur Medizinische Psychologie, Ludwig-Maximilians-Universitat  
"Are two receptor pigments involved in photo-effects on the Gonyaulax clock."

Gene Block, Department of Biology, University of Virginia  
"Cellular mechanisms governing entrained and free-running activity in a molluscan model pacemaker."

EVENING SESSION 19:30 - 22:00 Mammalian Genetics

Discussion Leader: Serge Daan, Department of Zoology, University of Groningen

G. Robert Lynch, Department of Biology, Wesleyan University  
"Quantitative genetic aspects of photoperiodism and circadian function in mammals."

Michael Menaker, Department of Biology, University of Virginia  
"The tau mutation in the hamster"

WEDNESDAY, June 28

MORNING SESSION 9:00 - 12:30 Vertebrate Retina and Pineal

Discussion Leader: Joseph Takahashi, Department of Neurobiology and Physiology, Northwestern University

Greg Cahill, Department of Anatomy and Cell Biology, Emory University  
"Indole metabolism and the circadian clock in the eye of Xenopus."

Martin Zatz, National Institute of Mental Health  
"Pharmacology and photosensitivity in the chick pineal."

Helena Illnerova, Institute of Physiology, Czechoslovak Academy of Sciences  
"Mechanism of Phase Advances of the Circadian Rhythm in the Rat Pineal  
N-acetyltransferase activity"

EVENING SESSION 19:30 - 22:00 Functional Aspects of Circadian Rhythms

Discussion Leader: Eberhard Gwinner, Max-Planck-Institut fur Verhaltensphysiologie

Serge Daan, Department of Zoology, University of Groningen  
"Annual reproductive timing and effort in the kestral (Falco tinnunculus)."

Jurgen Aschoff, Max-Planck-Institute fur Verhaltensphysiologie  
"On self-assessment of mood and efficiency during long-term isolation."

**THURSDAY, June 29**

**MORNING SESSION 9:00 - 12:30 Vertebrate Circadian Organization**

Discussion Leader: **Benjamin Rusak**, Department of Psychology, Dalhousie University

**Sato Honma**, Department of Physiology, Hokkaido University

"Hierarchy of the multiple oscillator system in rats; the SCN, food-entrainable, and  
metamphetamine-associated oscillators."

**Friedrich Stephan**, Department of Psychology, Florida State University

"Feeding as a Zeitgeber: Conceptual issues regarding a putative circadian pacemaking  
system."

**Herbert Underwood**, Department of Zoology, North Carolina State University

"Circadian organization in Japanese quail: The role of ocular and pineal oscillators."

**EVENING SESSION 19:30 - 22:00 Arthropods**

Discussion Leader: **Robert Barlow, Jr.**, Institute for Sensory Research, Syracuse University

**Gunther Fleissner**, Fachbereich Biologie, Johann Wolfgang Goethe-Universität

"Circadian multioscillators - What Can the Scorpion and Beetle Tell Us About Circadian  
Organization of Arthropods"

**George Renninger**, Department of Physics, University of Guelph

"Photoreceptor Organs for a Circadian Clock Modulating Photoreception in Limulus  
polyphemus"

**FRIDAY, June 30**

**MORNING SESSION 9:00 - 12:30 Mammals - Entrainment Pathways**

Discussion Leader: **R.Y. Moore**, Department of Neurology, SUNY at Stony Brook

**Nicholas Mrosovsky**, Department of Zoology, University of Toronto

"Non-photic entrainment: activity and its correlates."

**David Weaver**, Harvard Medical School

"Maternal Entrainment of the Developing Circadian System in Mammals."

**Larry Morin**, Department of Psychiatry, SUNY at Stony Brook

"Neural substrate for circadian rhythm phase control."

Gordon Research Conference on Chronobiology  
1989  
Posters

**Monday and Tuesday**

1. Molecular mechanisms of circadian clock control in Neurospora  
J. J. Loros, S. Denome and J. C. Dunlap, Dartmouth Medical School
2. Molecular analysis of the frequency Locus, a clock gene in Neurospora  
K. A. Johnson, C. R. McClung, B. Fox and J. C. Dunlap, Dartmouth Medical School
3. Molecular cloning and analysis of arg-13, os-1, and prd-4  
L. Qiuyun and J. C. Dunlap, Dartmouth Medical School
4. Molecular characterization of the circadian rhythm of the Cab gene expression in  
tomato leaves  
B. Piechulla, der Universität Göttingen
5. Circadian expression of nitrate reductase in unicellular alga Gonyaulax polyedra  
P. Colepicolo, L. Fritz, D. Morse and J. W. Hastings, Harvard University
6. Circadian variations of cAMP content in synchronously dividing and stationary-Phase  
cultures of the achlorophyllous ZC mutant of Euglena  
I. A. Carré, D. L. Laval-Martin and L. N. Edmunds, Jr., SUNY at Stony Brook
7. Oscillator control of cell division cycles in Euglena  
L. N. Edmunds, Jr., D. L. Laval-Martin, C. Tamponnet, I. A. Carré, SUNY at  
Stony Brook
8. Pentagastrin-stimulated DNA synthesis in mouse gut is influenced by the circadian  
system  
N. H. Rubin, D. C. Wofford, P. L. Rayford, C. M. Townsend, Jr. and J. C.  
Thompson, The University of Texas Medical Branch at Galveston
9. Calmodulin antagonist phase-shifts photosynthetic rhythm as well as cell division rhythm  
in Euglena gracilis  
K. Goto, Obihiro University
10. Comparison of the phase-shifting of the circadian K<sup>+</sup> uptake rhythm of Lemna by  
various amino acid analogs  
T. Kondo, National Institute for Basic Biology
11. Light and serotonin: Effects on proteins by two modulators of the circadian rhythm  
in the eye of Aplysia.  
U. Raju and A. Eskin, University of Houston
12. Temperature shift effects on daily rhythms (and their relationship to limit cycles)  
V. D. Gooch and C. Gross, University of Minnesota

13. Quantitative genetic analysis of photoresponsiveness and circadian function in the Djungarian hamster  
W. Puchalski, R. Kliman, C. B. Lynch and G. R. Lynch, Wesleyan University
14. Transgenic mice with a genome for human but not bovine growth hormone have a shorter tau.  
J. Ferraro, Southern Illinois University
15. Altered protein expression in period mutant hamsters  
G. Johnson, J. E. Joy, M. R. Ralph, M. Menekar and C. Merril, Health & Human Services, NIMH
16. Daily changes in antigen content revealed by monoclonal antibodies to the Bulla eye  
M. H. Roberts, Clarkson University
17. A second circadian rhythm from the eye of Bulla  
M. Geusz and T. Page, Vanderbilt University
18. Recording of plant movement and locomotor activity rhythms in animals by picture analysis  
J. Schuster and W. Engelmann, Universität Tübingen

#### Wednesday and Thursday

1. Sperm release from testis of the gypsy moth  
J. Rieman and J. Giebultowicz, USDA
2. The role of pineal and retinae in the circadian system of the European lizard Podarcis sicula campestris  
Augusto Foà, Università di Pisa
3. The effect of pinealectomy on plasma melatonin titers in the European starling and the house sparrow  
D. Janik, J. Dittami and E. Gwinner, Max-Planck-Institut für Verhaltensphysiologie
4. Effects of olfactory bulbectomy on the expression of circadian rhythms in mice  
B. Possidente, Skidmore College
5. Circadian activity rhythms in hypertensive and normotensive rat strains  
A. M. Rosenwasser, University of Maine
6. The midbrain noradrenergic ascending pathway is involved in the formation of prefeeding peaks but not in the circadian peaks in corticosterone, wheel-running, drinking and feeding activities in rats under periodic feeding  
K. Honma, Hokkaido University School of Medicine
7. Site specificity of SCN transplants in restoration of circadian locomotor rhythmicity in the Golden Hamster  
P. DeCoursey, J. Buggy and D. R. Bruce, University of South Carolina

8. Control of the phase and period of circadian rhythms restored by suprachiasmatic nucleus grafts  
E. Bittman, J. Basil, and J. Watt, University of Massachusetts
9. Organization of the human suprachiasmatic nucleus  
J. C. Speh and R. Y. Moore, SUNY at Stony Brook
10. Phase response to light during oral lithium or chlorgyline treatment  
H. Klemfuss and D.F. Kripke, VA Medical Center, San Diego
11. Intracerebral melatonin entrains rat running wheel activity.  
K.L. Brugge, H. Klemfuss, and D.F. Kripke, VA Medical Center, San Diego
12. A functional running wheel is not necessary for the development of split locomotion in Syrian hamsters (Mesocricetus Auratus)  
C. E. McCormack, The Chicago Medical School
13. Can running wheel activity entrain circadian rhythms?  
J. S. Kruse, University of Rochester Medical Center
14. Conflicting zeitgebers and the circadian rhythm of Mus booduga pups  
M. K. Chandrashekaran, Madurai Kamaraj University
15. The effects of constant dim light on the sensitivity of the hamster circadian oscillator to brief light pulses  
D. Nelson and J. Takahashi, Northwestern University
16. Diurnal variations in human retinal sensitivity  
T. Roenneberg, M. Lotze, N. V. Steinbuechel and E. Poeppel, Hamburg University
17. Annual rhythm of human reproduction  
T. Roenneberg and J. Aschoff, Max-Planck-Institute für Verhaltensphysiologie
18. Photoperiodic responses differ in inbred strains of golden hamsters  
M.M. Hotz and F.W. Turek, Northwestern University

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